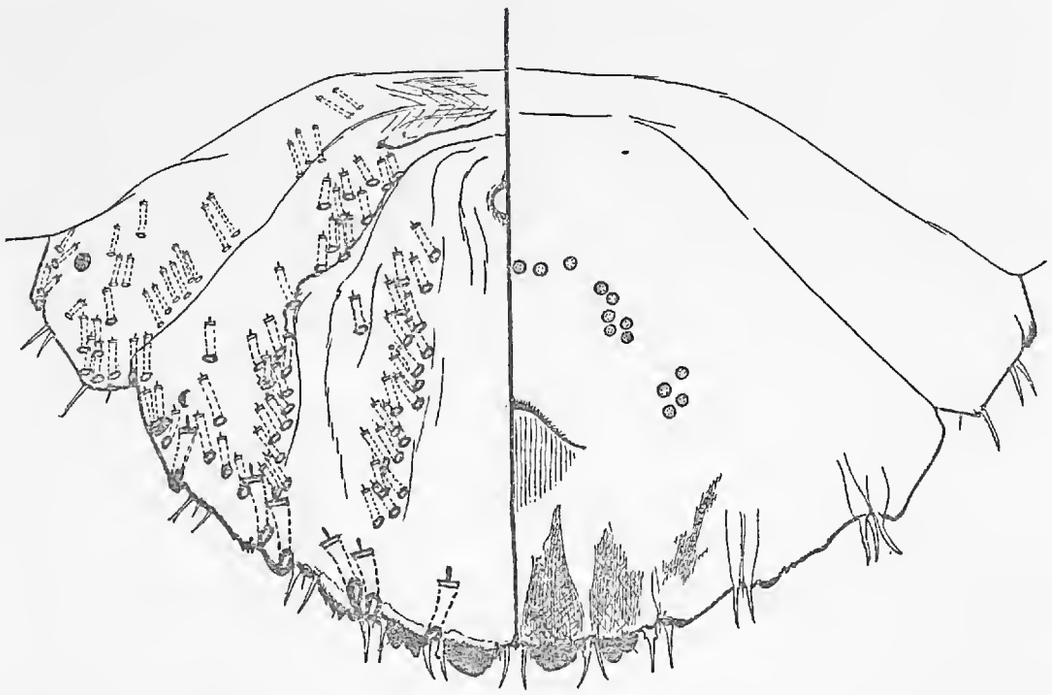

Figure 2. *Lepidosaphes chinensis* sp. nov. Pygidium of adult female.

THE HATCHING OF THE EGGS OF PERIPSOCUS CALIFORNICUS BANKS

BY SIBYL WACHTER

Peripsocus californicus Banks is a species of the family Psocidæ (Corrodentia). It is commonly found on the leaves and bark of several species of garden shrubs and trees.

The eggs of this species are laid in masses of nine or ten on the underside of the leaves, beneath a silken web which is, as a rule, covered with a loosely woven canopy. Occasionally, the canopy is absent. Observed individuals have been seen to oviposit six masses of eggs within ten days' time, the laying of each mass covering a period of from twenty-four to forty-eight hours. The eggs hatch in from eight to ten days from the time of laying.

The first external indication of life in the eggs, as viewed under the binocular microscope, is the appearance of a black structure extending from the apex of the narrower anterior end of the transparent shell backward about a fifth of the length of the egg. It becomes very distinct the day before hatching. The immediate sign of hatching is the movement of this mechanism or egg-burster, followed practically simultaneously by the appearance of a bubble of air at its basal extremity.

Under the microscope the egg-burster appears as an elongated crescent-shaped saw, semi-circular at its basal extremity,

with the serrate edge extending from this point to its sharply pointed anterior end. The serrate edge indents one-third of its width. This mechanism is a part of the amnion, to which it is attached basally by strands of membrane slightly heavier than the rest of the amnion.

In this latter structural detail of the egg-burster we are able to verify a previous statement of Peyerinoff, who described a frontal chitinous organ consisting of a dentate ridge upon the amnion of a young psocid. We came to this conclusion from observing the amnion slip from the embryo as the body worked itself free, for as it contracted into a wrinkled mass at the opening of the chorion, the amnion carried with it the tiny saw, with the aid of which the embryo had attained its freedom. Furthermore, after dissecting the embryo from the chorion when it was about to hatch, we were able to slip the embryo out of the amnion, the egg-burster remaining as a part of the amnion.

In hatching, consecutive movements of the egg-burster increase gradually the extent of the area through which it works until it finally cuts through the chorion. Two or three movements are followed by a period of inactivity. In some instances these periods last five to ten minutes. At corresponding intervals bubbles of air may be seen passing into the œsophagus, where they increase in size and number as the process advances, and, passing down through the entire digestive tract, inflate the body. After a few movements of the egg-burster the basal end protrudes through the chorion, and at the break the edges wrinkle back as the opening increases. In the posterior region of the chorion deflation occurs, as though by the creation of a vacuum at that point, as the frontal area of the embryo breaks through and begins to push upward. At this time, which averages five minutes from the first signs of activity, bubbles of air enter the alimentary canal in rapid succession, some six or eight following each swing of the egg-burster. This now moves through a considerable area. The direction of movement is back and forth in the direction of the longitudinal axis of the egg.

Each proximal movement of the anterior extremity of the burster against the anterior extremity of the head of the embryo causes a very decided indentation at that point. This is followed by a distal movement of the burster upon which the

membrane resumes its previous turgid condition. There is apparently a direct relation between the movements of the burster and the accumulation of air in the digestive tract by means of which the embryo issues from its membranal envelope. This, then, would indicate an additional use of the burster. The amnion tears triangularly from the basal extremity of the burster toward its anterior extremity. The pressure exerted upon the inflated body by the proximal movement of the burster would thus seem to play some part in freeing the embryo. Previous references to the function or air and the use of the burster in the hatching of the Psocidæ have been reviewed by Knab.[1]

In emerging from the chorion the embryo takes barely a minute to attain an upright position. The body rotates continually in line with the position of the egg and soon bends forward, so that the burster is hidden from view. It is covered with the amnion and presents a smooth transparent appearance with distinct black eye-spots, which appear soon after emergence. The interior is still filled with air bubbles. As the anterior end bends forward and down, almost touching the chorion, the amnion snaps off, splitting just below the eyes, and is thrown off by pressure from within, a part of it remaining as a wrinkled mass at the split in the chorion and a part extending backward from the burster in the form of a minute triangle. The body of the insect now straightens out, the constriction between the head and thorax becomes evident, the legs are raised and begin to move with considerable rapidity toward and away from the body, and the palps and antennæ are gently waved. The slipping off of the amnion from the time the body bends over to the time of the freedom of the appendages, and backward movement of the body into an upright position averages three minutes. The entire hatching period of the egg varies from twenty to forty minutes. Its length seems to be determined largely by the duration of the intervals of inactivity of the burster and the time needed to accumulate air bubbles in the first stages of hatching.

After moving the appendages up and down for a few moments, the insect moves forward to rest lightly on its delicate legs, and finally walks away from the egg mass. It remains quite inactive for a time except for slight movements of the abdomen, in which the air bubbles are still visible. These gradually disappear. Five minutes later the psocid walks away and for several hours remains relatively inactive.

1 Knab, Frederick, The Role of Air in the Ecdysis of Insects. Proc. Ent. Soc., Wash., Vol. XI, 1909, 68-73.